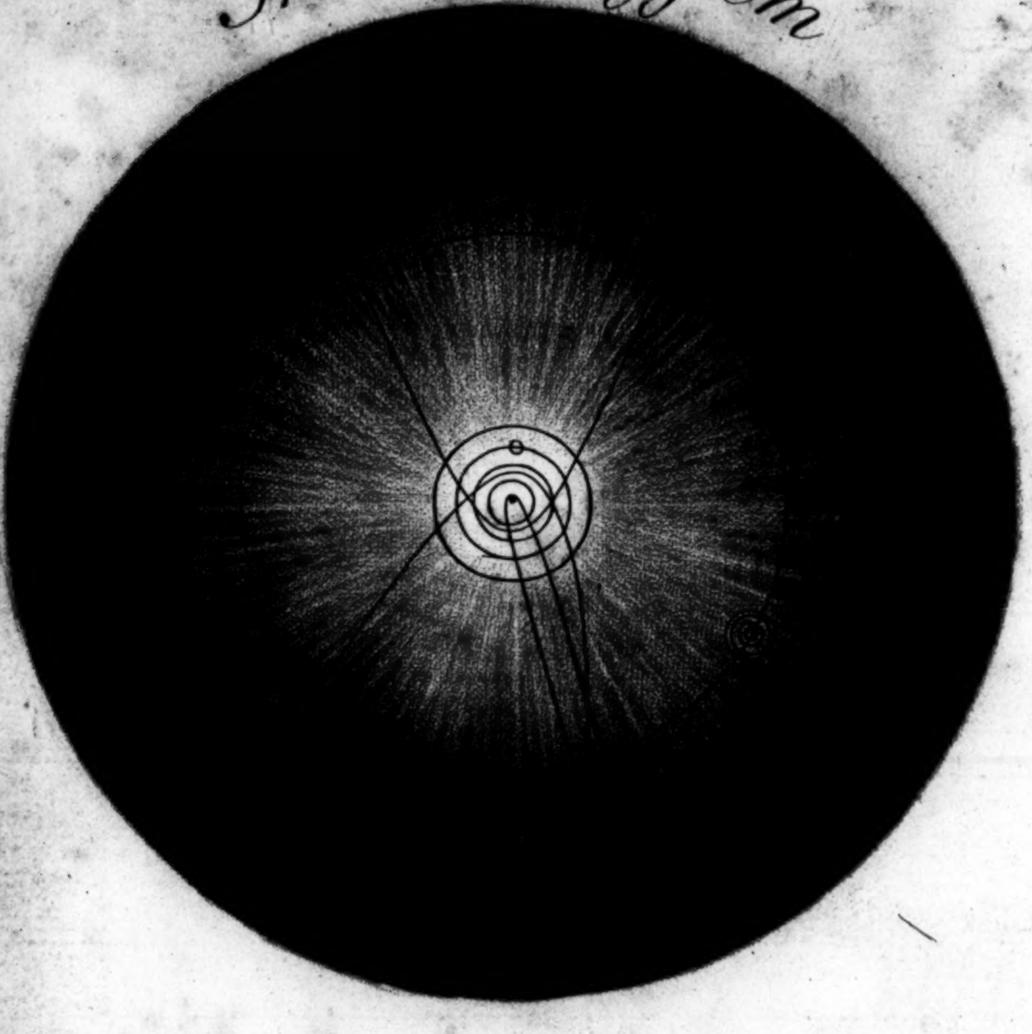
The Solar System



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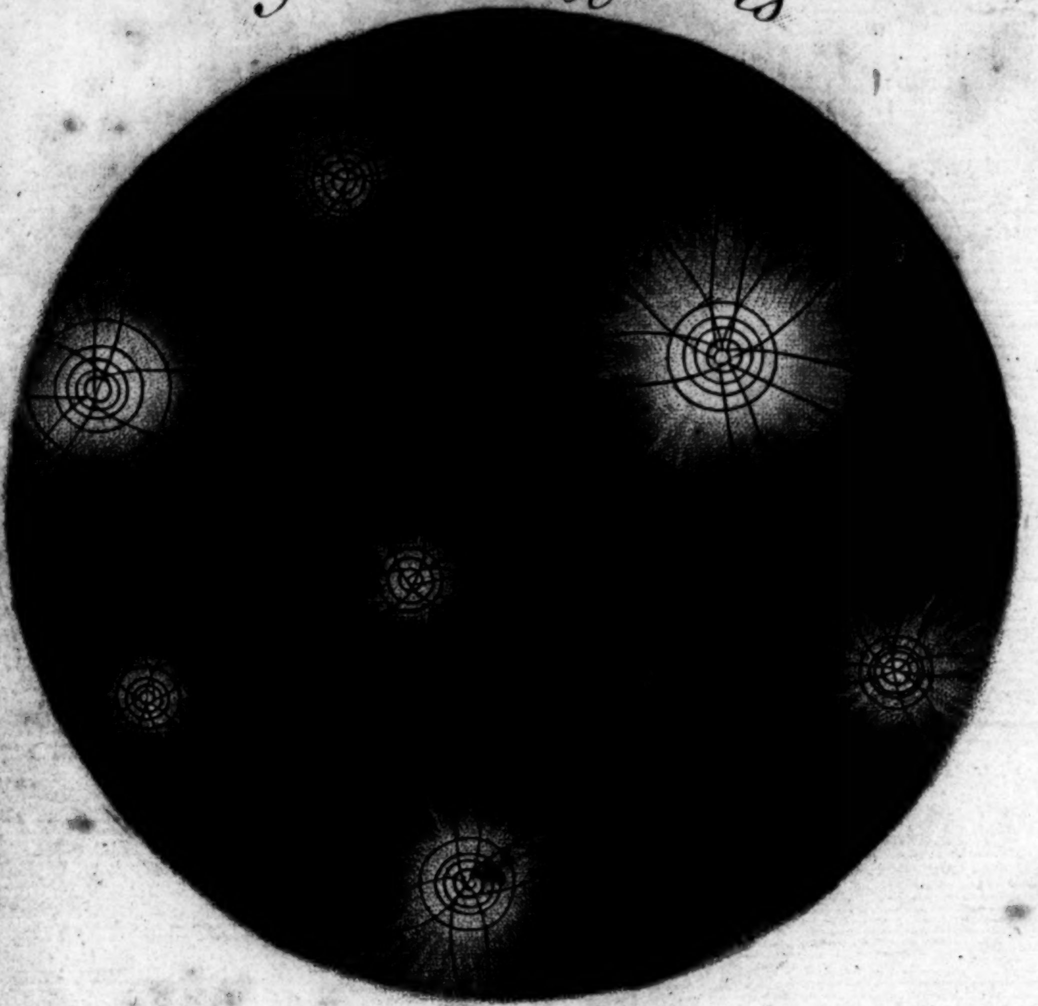
Siderial Syſtems



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AN IDEA OF THE MATERIAL UNIVERSE,

Deduced from a SURVEY of the

SOLAR SYSTEM.

By *JAMES FERGUSON*.

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AN IDEA OF THE MATERIAL UNIVERSE.

OF all the Sciences cultivated by Mankind, Aſtronomy is acknowledged to be, and undoubtedly is, the moſt ſublime, the moſt intereſting, and the moſt uſeful. It more effectually than all the reſt, comes home to Men's Buſineſs and

Boſoms; as Lord Bacon phraſes it. For by Knowledge derived from Aſtronomy, not only the Bulk of the Earth is diſcovered, the Situation and Extent of the Kingdoms and Countries upon it aſcertained, Trade and Commerce carried on to the remoteſt Parts of the World, and the various Products of ſeveral Countries diſtributed for the Health, Conveniency and Comfort of its Inhabitants; but our very Faculties are enlarged with the Grandeur of the Ideas it conveys, our Minds exalted above the low and contracted Prejudices of the Vulgar, and our Underſtandings clearly convinced, and affected with the Conviction, of the Exiſtence, Wiſdom, Goodneſs, Power, and Superintendency of the SUPREME BEING: So that without an Hyperbole,

An undevout Aſtronomer is mad.

From this Branch of Knowledge, we alſo learn the Means or Laws the Almighty makes uſe of to carry on, and continue, the admirable Harmony, Order, and Connexion obſervable throughout the material World:

And are led by very powerful Arguments to form the pleaſing Deduction, that Minds capable of ſuch deep Reſearches derive their Origin from Heaven, and are incited to aſpire thither as to their proper and final Habitation.

By Aſtronomy we diſcover, that the Earth is at ſuch a Diſtance from the Sun, that if ſeen from thence, it would appear no bigger than a Point, although its Circumference is 25,020 Miles: Yet that Diſtance is ſo ſmall, compared with the Diſtance of the fixed Stars, that if the Orbit in which the Earth moves about the Sun was ſolid, and ſeen from the neareſt Star, it would likewiſe appear no bigger than a Point, although it is known to be at leaſt 3564 Millions of Miles in Circumference. For, by the beſt Obſervations, the Parallax of the fixed Stars ſcarcely amounts to one Second; and a Teleſcope which magnifies above 200 times, does not ſenſibly magnify them; which proves them to be at leaſt 400 thouſand Times farther from us than the Sun: And this is the Reaſon that neither their Magnitudes, Diſtances nor Poſitions are ſenſibly changed, although the Earth approaches 162 Millions of Miles nearer to ſome of them at one Time of the Year than another.

The Reaſon why the Sun appears to us ſo much brighter and larger than the fixed Stars is, becauſe we conſtantly keep near the Sun, and are at ſuch an immenſe Diſtance from the Stars. For, a Spectator placed as near to any fixed Star as we are to the Sun, would ſee it a Body as large and bright as the Sun appears to us: And a Spectator as far diſtant from the Sun as we are from the Stars would ſee the Sun as ſmall as a Star; and would reckon it one of the Stars in numbering them.

The Stars, being at ſuch an immenſe Diſtance from the Sun, cannot poſſibly receive from him ſo ſtrong a Light as they appear to have; nor any Brightneſs ſufficient to make them at all viſible to us: And therefore, they muſt ſhine with their own native and unborrowed Luſtre, as the Sun does. And being as big, and like it, each confined to one Portion of Space, they are, of conſequence, of the ſame Nature with our Sun.

It is not to be imagined that all theſe Stars are placed in one concave Surface, ſo as to be all equally diſtant from us; but that they are ſcattered at vaſt Diſtances from one another through unlimited Space. So that there may be as great Diſtance betwixt any two of the nearer Stars as betwixt our Sun and them. Hence, a Spectator, who is neareſt to any fixed Star, will only look upon it as a real Sun; and conſider the reſt as ſo many ſhining Points fixed at equal Diſtances from him in the Firmament.

By the Help of Teleſcopes, we diſcover thouſands of Stars which are inviſible to the naked Eye: And the better our Glaſſes are, ſtill the more become viſible, ſo that we can ſet no Limits either to their Numbers or Diſtances. The celebrated *Huygenius* carries this Thought ſo far, as not to believe it impoſſible that there may be Stars at ſuch inconceivable Diſtances, that their Light has not yet reached the Earth ſince the Creation; notwithſtanding the amazing Velocity of Light which flies a Million of Times ſwifter than a Cannon Bullet. And this Thought is far from being extravagant, when we conſider, that the Univerſe is the Work of an infinite Power, prompted by infinite Goodneſs, having an infinite Space to exert itſelf in; ſo that our Imagination can ſet no Bounds to it.

It is no ways probable that the Almighty, who always acts with infinite Wiſdom, and does nothing in vain, ſhould create ſo many glorious Suns, fit for ſo many important Purpoſes, and ſet them at ſuch vaſt Diſtances from one another, without any Object near enough to be benefited by their Influences. Whoever imagines that God created them only to give us a faint glimmering Light, muſt have a very mean Opinion of the Divine Wiſdom: Since by an infinitely leſs Exertion of creating Power he could have given us much more Light by one ſingle additional Moon.

Instead then of one Sun and one World only in the Univerſe, as the unſkilful in Aſtronomy imagine, that Science diſcovers to us ſuch an inconceivable Number of Suns, Syſtems, and Worlds, ſcattered through boundleſs Space, that if our Sun, with all the Planets, Moons, and Comets belonging to it, were annihilated, they would no more be miſſed out of the Univerſe than a Grain of Sand from the Sea Shore; the Space they poſſeſs being comparatively ſo ſmall, that it would ſcarce leave a ſenſible Blank in the Creation; although the outermoſt of our Planets revolves about the Sun in an Orbit of 2,442 Millions of Miles in Circumference, and ſome of our Comets make Excurſions upwards of 10,000 Millions of Miles beyond that Planet's Orbit.

From what we know of our own Syſtem, it may be reaſonably concluded that all the reſt are with equal Wiſdom contrived, ſituated, and provided with Accommodations for rational Inhabitants. Let us therefore take a general Survey of the Syſtem to which we belong, the only one acceſſible to us, and from thence we ſhall be the better enabled to judge of the Nature and End of the other Syſtems of the Univerſe: For although there is almoſt an infinite Variety in all the Parts of the Creation which we have Opportunities of examining, yet there is a general Reſemblance and Analogy running through, and connecting each Part into one Scheme, one Deſign, one Whole.

The Sun, together with the Planets, Satellites, and Comets, conſtitute the ſolar Syſtem. Thoſe Planets which are nearer the Sun not only finiſh their Circuits ſooner, but likewiſe move faſter in their reſpective Orbits than thoſe which are more remote. Their Motions are all round the Sun from Weſt to Eaſt, in Curves nearly circular: Their Names, Diſtances, Bulks, and periodical Revolutions, are as follows:

The Sun, that immenſe Globe of Fire, is placed near the common Center, or rather Focus, of the Orbits of all the Planets and Comets, turning round his Axis in 25 Days 6 Hours, as is evident by Spots ſeen on his Surface. His Circumference is 2 Million

398 Thouſand Miles; and by the various Attractions of the circumvolving Planets he is agitated by a ſmall Motion round the Center of the Syſtem. As ſeen from him, all the Planets conſtantly move the ſame Way; but from any one Planet, the reſt appear ſometimes to move forward, ſometimes backward, and ſometimes to ſtand ſtill, not in Circles nor Ellipſes, but in looped Curves which never return into themſelves. The Comets, ſeen from any Part of the Syſtem, come from all Parts of the Heavens, and move in all Sorts of Directions.

MERCURY, the neareſt Planet to the Sun, goes round him in 87 Days 23 Hours of our terreſtrial Time, which is the Length of his Year; but being rarely ſeen, and no Spots appearing on his Diſc, the Time of his Rotation on his Axis, or Length of his Days and Nights, is to us unknown. His Diſtance from the Sun is 32 Millions of Miles, and his Circumference 13 Thouſand 350. He moves 100 Thouſand Miles in his Orbit every Hour; his Light and Heat is ſeven Times as much as ours, and to him the Sun appears ſeven Times as large as to us.

VENUS, the next Planet in Order, is 59 Millions of Miles from the Sun, and travelling at the Rate of 70 Thouſand Miles every Hour, finiſhes her annual Circuit in 224 of our Days and 17 Hours; in which Time ſhe has only 9 $\frac{1}{4}$ Days. Her Axis inclines 75 Degrees from the Axis of her Orbit; on which Account, the Length of her Days and Nights differ much more in Proportion, and the Variation of her Seaſons is greater, than thoſe of our Earth. She very ſeldom has the Forenoon and Afternoon of the ſame Day equally long; and what is very remarkable, at the Equator, ſhe has the four Seaſons twice every Year, as ſenſibly diſtinguiſhed as ours are at London. Her Equinoxes ſhift backward a Quarter of a Day, every Year. To her the Sun's Declination is about 30 Degrees at a mean State each Day, which will make the Longitude of her Places very eaſy to be found. She is our Morning and Evening Star by Turns, and her Light and Heat is almoſt double of ours.

THE EARTH, betwixt the Orbits of Venus and Mars, is 81 Millions of Miles from the Sun, and revolves round him in 1 Year, or 365 Days 5 Hours 49 Minutes, moving at the Rate of 58 Thouſand Miles every Hour; which, though 120 Times ſwifter than the Motion of a Cannon Bullet, is little more than half the Swiftneſs of Mercury's Motion. The Earth's Circumference is 25 Thouſand and 20 Miles; and it turns round its Axis from Weſt to Eaſt in 24 Hours, which occaſions an apparent diurnal Motion of all the heavenly Bodies from Eaſt to Weſt in that Time. Its Axis inclines 23 ½ Degrees from the Axis of its Orbit, which cauſes the Returns of Spring, Summer, Autumn, and Winter. Beſides phyſical Arguments, which are abundantly ſatisfactory, the Earth's Rotation on its Axis is evident from its ſpheroidal Figure, which neceſſarily reſults from ſuch a Motion. That it is really of this Figure is demonſtrable, from the unequal Vibrations of a Pendulum, and the unequal Length of a Degree, in different Latitudes. Since then the Earth is higher at the Equator than at the Poles, the Sea, which naturally runs downward, or toward the Places which are leaſt diſtant from the Center, would run toward the polar Regions and leave the equatorial Parts dry, if the centrifugal Force of the latter did not raiſe and carry the Water thither.

THE Seas and unknown Parts of the Earth contain 160,522,026 ſquare Miles; the inhabited Parts 38,990,569; Europe 4,456,065; Aſia 10,768,823; America 14,110,874: In all 199,512,595, which is the Number of ſquare Miles on the whole Surface of our Globe.

THE MOON is the Earth's Satellite, her Circumference is 6,836 Miles, and at the Diſtance of 240,000 Miles from the Earth's Center, revolves round it from Change to Change in 29 Days 12 Hours 44 Minutes; turning round her Axis from the Sun to the Sun again exactly in that Time, which is the Reaſon of her keeping ſtill the ſame Side towards the Earth, and that a Day and Night in her is as long as a lunar Month with us. She is an opaque Globe like the Earth, and ſhines only by the Light of the Sun; therefore while that Hemiſphere which is turned toward the Sun is enlightened, the other muſt be dark and inviſible. There is ſcarce any Variation of Seaſons in the Moon; and, what is very ſingular, one Half of her has no Darkneſs at all, the Earth conſtantly affording it a ſtrong Light in the Sun's Abſence; while the other half has a Fortnight Darkneſs and a Fortnight Light by Turns. To her our Earth is a Moon, which grows and wanes regularly; appearing 15 Times as big, and affording her 15 Times as much Light, as ſhe does to us. When the Moon is new to us, the Earth is full to the Moon; and *vice verſa*. From one Half of the Moon the Earth is never ſeen at all: from the Middle of the other Half it is always ſeen over Head: from other Parts, always in or near the Horizon; and from the intermediate Parts, at proportional Altitudes with little Variation. As our Earth turns on its Axis, the ſeveral Continents, Seas and Iſlands will appear like ſo many Spots of different Forms and Brightneſs moving over its Surface; and thereby become a very good Dial to the Lunarians for meaſuring their Time.

A Problem extremely difficult to us may be eaſily ſolved by them, for the Longitude of Places in the Moon may as exactly and readily be found, by Means of our Earth, as the Latitude is with us.

Sometimes the Moon when ſhe changes, comes ſo directly between the Sun and Earth as to hide or eclipſe the Sun from our Sight, and ſometimes ſhe is ſo directly oppoſite to the Sun when full, as to go through the Earth's Shadow and be eclipſed herſelf. When the Sun is eclipſed to us, the Earth is eclipſed to the Moon's Inhabitants, but never total. And when the Moon is eclipſed to us, the Sun is eclipſed to them, often totally for three Hours together, though to us it never laſts above four Minutes. Theſe Eclipſes would happen at every new and full Moon, if the Moon's Orbit lay in the ſame Plane with the Earth's: But as one Half of the Moon's Orbit is above and the other Half below the Earth's, croſſing it in two oppoſite Points, called the Moon's Nodes, there can be no Eclipſes but when the new or full Moon happens in or near one of theſe Points. They move backward, through all Parts of the Moon's Orbit in 18 Years and 225 Days; and always in 173 Days after the Sun is in Conjunction with either of the Nodes, he is in Conjunction with the other.

In 18 Years 10 Days 7 Hours and 43 Minutes after the Sun, Moon and Nodes have been in Conjunction, they come to a Conjunction again. If the Conjunction you reckon from falls in a Leap Year, the Return of the Conjunction is a Day later: Therefore, if to the mean Time of any Eclipſe of the Sun or Moon in a Leap Year, you add 18 Years, 11 Days, 7 Hours, 43 Minutes, or in a common Year a Day leſs, you will have the mean Time of that Eclipſe returned again; though not always viſible, becauſe the 7 Hours 43 Minutes may ſhift a ſolar Eclipſe into the Night, and a lunar Eclipſe into the Day.

The Planet Mars is next in Order, above the Earth's Orbit: his Diſtance from the Sun is 123 Millions of Miles; and, by travelling 45 Thouſand Miles every Hour in his Orbit, goes round the Sun in 1 Year

322 Days 17 Hours, which is the Length of his Year. His Circumference is 13 Thouſand 297 Miles; he turns round his Axis in 24 Hours 40 Minutes, which is the Length of his natural Day; and the Quantity of his Light and Heat is but equal to one half of ours. This Planet not exceeding one fourth Part of our Earth's Bulk, if any Moon attends it ſhe muſt be very ſmall, and has never yet been diſcovered by our beſt Teleſcopes. He appears ſometimes gibbous, but never horned, which ſhews that his Orbit includes the Earth's within it, and that he ſhines not by any Light of his own. To him our Earth and Moon appear like two Moons, a bigger and a leſſer, changing Places with reſpect to one another, and appearing ſometimes horned, ſometimes Half or three Quarters illuminated, but never full, nor at moſt above a Quarter of a Degree from each other, though 240 Thouſand Miles diſtant. To ſuch Eyes as ours, if unaſſiſted by proper Inſtruments, Mercury can never be ſeen from Mars, except in paſſing over the Sun's Diſk; but all the other Planets will be viſible.

JUPITER, the biggeſt of all the Planets, is ſtill higher in the Syſtem, being 424 Millions of Miles from the Sun, and going at the Rate of 24 Thouſand Miles every Hour, finiſhes his annual Period in eleven Years, 313 Days, 15 Hours. His Circumference is 254 Thouſand 469 Miles, which makes him above 1000 Times bigger than the Earth. He revolves round his Axis in 9 Hours 56 Minutes, on which Account the diurnal Velocity of his equatorial Parts exceeds the Swiftneſs wherewith he moves in his Orbit; which is a ſingular Circumſtance ſo far as we know. The Axis of this Planet is ſo nearly perpendicular to its Orbit that he has no ſenſible Change of Seaſons, which is an Advantage in Jupiter: For if his Axis inclined any conſiderable Number of Degrees, juſt ſo many Degrees round each Pole would be almoſt ſix Years together in Darkneſs; and conſidering that each Degree there at a mean State contains ~~5000~~ 700 of our Miles, it is eaſy to judge what vaſt Tracts of Land would thereby be uninhabitable; more eſpecially as none of his Moons are ſeen from his polar Regions.

The ſmall Quantity of Light and Heat he derives from the Sun, which is but $\frac{1}{28}$ Part of ours, is compenſated by its quick Returns, and by four Moons, none of them leſs than our Earth, which revolve round him; ſo that there is ſeldom any Part of this huge Planet but what is enlightened by one or more of them, excepting near the Poles, where there is no Need of them; becauſe the Sun conſtantly circulates in or near their Horizon without ſetting. The firſt, or neareſt Moon to Jupiter goes round him in 1 Day, 18 Hours, 36 Minutes; the ſecond in 3 Days, 13 Hours, 15 Minutes; the third in 7 Days, 3 Hours, 59 Minutes; and the fourth in 16 Days, 18 Hours, 30 Minutes. This Planet ſeen from its neareſt Moon appears one thouſand Times as large as our Moon does to us; taking up a ſixth Part of the viſible Heavens; growing and waneing in all the Shapes of our Moon every 36 $\frac{1}{2}$ Hours. By the Eclipſes of theſe Moons, which happen in every Revolution round Jupiter, Aſtronomers have not only diſcovered that Light comes from the Sun to us in 7 $\frac{1}{2}$ minutes, but have alſo determined the Longitudes of Places on this Earth with greater Certainty and Facility than by any other Method yet known.

Saturn, the remoteſt of all the Planets, is 777 Millions of Miles from the Sun; and by travelling at the Rate of 18 Thouſand Miles every Hour, goes round the Sun in 29 Years, 167 Days, 10 Hours, which makes only one Year in that Planet. His Circumference is 191 Thouſand 637 Miles. He is 600 Times as big as the Earth, and is ſurrounded by a broad thin Ring encompaſſing his Body as an Horizon does a Globe, and inclined 30 Degrees to his Orbit; its Breadth is 21 Thouſand Miles, equal to its Diſtance from Saturn. To this Planet the Sun appears only $\frac{1}{90}$th Part ſo big as to us, and the Light and Heat he receives from it is in the ſame Proportion to ours: But to compenſate for that, he has five Moons going round him, all on the Outſide of his Ring, and nearly in the ſame Plane with it. The Sun ſhines on one Side of the Ring during one Half of Saturn's Year, and on the other Side during the other Half: ſo that it will appear to his Inhabitants for almoſt 15 of our Years together, and diſappear as long by Turns, if his Axis is not inclined to the Plane of his Ring. But if it is inclined thereto, as is more likely, the Ring as well as the Moons will be ſeen every diurnal Revolution of Saturn. This Ring will appear like a vaſt luminous Arch, frequently eclipſing the Sun, twice in a Saturnian Day if the Axis be inclined to the Ring; but if it be not, the Shadow, which is prodigiouſly large all acroſs the Body of the Planet, will hide the Sun from vaſt Tracts of it for ſeveral of our Years together, which is another preſumptive Proof of the Inclination of its Axis. When we ſee the Ring moſt open, its Shadow on the Planet is broadeſt, and from that Time it grows narrower, until the Sun comes to the Plane of the Ring, which being then turned edge-wiſe to us, diſappears on Account of its Thinneſs; and this happens twice in each Revolution of Saturn round the Sun. To ſuch Eyes as ours, unleſs aſſiſted by Inſtruments, neither Mars, the Earth, Venus, nor Mercury, can be ſeen either from Saturn or Jupiter. It has not yet been diſcovered in what Time Saturn turns round his Axis, and therefore the Length of his Days are to us unknown.

The Inhabitants about Venus's Equator are carried 43 Miles therewith, every Hour, by turning round her Axis; thoſe about our Earth's Equator 1042 Miles in the ſame Time; thoſe about Mars's 566; and thoſe about Jupiter's 25,940; beſides that of their hourly Velocities in their Orbits already mentioned.

The Planets are retained in their Orbits by the duly balancing of their projectile Forces to the Power of the Sun's Attraction. If the projectile Force of each Planet was ſtopped, and the Sun ſhould continue to attract it, Mercury would fall to the Sun in 15 Days 18 Hours, Venus in 39 Days 17 Hours, the Earth in 64 Days 10 Hours, Mars in 121 Days, Jupiter in 390, and Saturn in 767.

To aſſiſt the Imagination in conceiving the vaſt Diſtances of the Planets and Stars, let us ſuppoſe that a Body projected from the Sun ſhould continue to fly with the Swiftneſs of a Cannon Bullet, i. e. 480 Miles every Hour; this Body would reach the Orbit of Mercury in 7 Years 221 Days, of Venus in 14 Years 8 Days, of the Earth in 19 Years 91 Days, of Mars in 29 Years 85 Days, of Jupiter in 100 Years 280 Days, of Saturn in 184 Years 240 Days, to the Comet of 1680 in its Aphelion in 2580 Years, and to the neareſt fixed Stars in about 7 Million 600 Thouſand Years.

As the Earth is not the Center of the Planet's Motions, they come nearer to it, and go further from it in ſome Parts of their Orbits than other; on which Account their Diſks or Surfaces appear bigger and leſſer at different Times. Mercury appears 5 ½ Times as big at his leaſt Diſtance as at his greateſt; Venus 32 Times as big; Mars 25 Times; Jupiter a little more than twice as big; and Saturn half as much bigger. Hence their apparent Bulks in the Heavens are not always a certain Rule to know them by.

THE COMETS are ſolid opaque Bodies, with long tranſparent Trains or Tails iſſuing from the Side which is turned from the Sun. They move about the Sun in very excentric Ellipſes, and are of a much greater

Denſity than our Earth; for ſome of them in every Period are heated to ſuch a Degree as would vitrify or diſſipate any Subſtance known to us. It is thought there are at leaſt 21 belonging to our Syſtem, but the Periods only of three are known with any Degree of Certainty. The firſt of theſe appeared in the Years 1531, 1607, and 1682, and is expected to appear again in 1758, and every 75th Year afterwards. The ſecond of them in 1532 and 1661, and ſo may be expected to return in 1789 and every 129th year after. The third, having laſt appeared in 1680, and its Period being no leſs than 575 Years, cannot return until the Year 2255. This Comet, at its greateſt Diſtance from the Sun, is 10 thouſand 878 Millions of Miles beyond Saturn's Orbit; and at its leaſt Diſtance, which is 490,000 Miles, the Sun, as ſeen from it, appears 100 Degrees in Breadth, and conſequently 40 Thouſand Times as large as he does to us.

THE extreme Heat, the denſe Atmoſphere, the groſs Vapours, the chaotic-like State of Comets, ſeem to indicate them unfit for the Purpoſes of animal Life, and a moſt uncomfortable Habitation for rational Beings. Nevertheleſs, when we conſider on the other Hand the infinite Power and Goodneſs of the Deity, the latter inclining, and the former enabling him to make Creatures ſuited to all States and Circumſtances; that Matter exiſts only for the Sake of Intelligence, and wherever we find it, we find it always pregnant with Life, or neceſſarily ſubſervient thereto; the numberleſs Species, the aſtoniſhing Diverſity of Animals in Earth, Air, Water, and even on other Animals, every Blade of Graſs, every tender Leaf, every natural Fluid, ſwarming with Life, which in ſome, as the Salamander, Fire itſelf does not ſoon extinguiſh; and each enjoying ſuch Gratifications as their Nature and State require; when we reflect moreover, that ſome Centuries ago, 'till Experience undeceived us, a great Part of our Earth was judged uninhabitable; the torrid Zone by reaſon of exceſſive Heat, and the frigid Zones on account of exceſſive Cold: From theſe Conſiderations, it ſeems highly probable that ſuch numerous and large Maſſes of durable Matter as the Comets, the moſt conſiderable Part of our Syſtem, however unlike they are to our Earth, are not deſtitute of Beings capable of contemplating with Wonder, and acknowledging with Gratitude, the Beauty, Wiſdom, and Symmetry of the Creation; which is more plainly to be obſerved in their extenſive Tour through the Heavens, than in our more confined Circuit. If farther Conjecture is permitted, may not one ſuppoſe they are peopled with guilty Creatures reclaimable by Sufferings, as we are on the Earth; and, like every thing elſe that falls under our Obſervation, may be ſubſervient to other ſecondary Purpoſes; ſuch as recruiting the expended Fuel of the Sun; ſupplying the exhauſted Moiſture of the Planets; cauſing Deluges and Conflagrations for the Correction and Puniſhment of Vice? However difficult it may be, circumſtanced as we are, to find out their particular Deſtination, this is an undoubted Truth, that wherever the Deity exerts his Power, there he alſo manifeſts his Wiſdom and Goodneſs.

By an attentive Conſideration of this ſhort Survey of the Solar Syſtem, we may learn that the Planets with their Attendants are much of the ſame Nature with our Earth, and deſtined for the ſame Purpoſes: For they are ſolid and opaque Globes, capable of ſupporting Animals and Vegetables. Some of them are greater, ſome leſs, and ſome much about the Size of the Earth. They all circulate round the Sun as the Earth does, in a ſhorter or longer Time, according to their Diſtances; and have, where it would not be inconvenient, regular Returns of Summer and Winter, Spring and Autumn: They have warmer and colder Climates, as the various Productions of our Earth require: And in ſuch as afford any Poſſibility of diſcovering it, we perceive a regular Rotation round their Axes, like that of the Earth, making Day and Night alternately, which is neceſſary for Labour, Reſt, and Vegetation; and expoſes all Parts of their Surfaces to the Influence of the Sun's Rays. Such of the Planets as being furtheſt from the Sun enjoy leaſt of his

Light have that Deficiency compenſated by ſeveral leſſer Planets or Moons, which continually accompany and revolve round them as our Moon does round us. The remoteſt of them has over and above, a broad Ring encompaſſing him, which, like a lucid Zone in the Heavens, reflects the Sun's Light very copiouſly upon the Planet: So that if they have the Sun's Light fainter by Day than we, they have an Addition made to it Morning and Evening by one or more Moons, and a greater Light in the Night-time. On the Surface of the Moon, becauſe it is nearer us than any other of the celeſtial Bodies, we diſcover a more minute and ſtrong Reſemblance of the Earth; for, by the Aſſiſtance of Teleſcopes, Seas and Lakes, Mountains, Valleys, and deep Cavities are obſerved in it. Theſe Similarities leave no Room to doubt that not only our Moon, but all the other Planets and Moons in the Syſtem are of like Nature with our Earth, and deſigned as commodious Habitations for Creatures endowed with Capacities of knowing, obeying and adoring their beneficent Creator.

SINCE the numberleſs fixed Stars are prodigious Spheres of Fire like our Sun, and at inconceivable Diſtances from one another, as well as from us, it is reaſonable to conclude they are made for the ſame Purpoſes that the Sun is; each to beſtow Light, Heat and Vegetation on a certain Number of inhabited Planets, kept by Gravitation within the Sphere of its Activity.

WHAT an auguſt! what an amazing Conception, if human Imagination can conceive it, does this afford of the Works of the Creator! Thouſands of Thouſands of Suns, extending without End beyond one another, all round, and at immenſe Diſtances ranged in the moſt beauteous Order, accompanied with ten Thouſand Times ten Thouſand Worlds, ſelf-ballanced, all in rapid Motion, yet calm and ſmooth, regular and harmonious, invariably keeping the Paths preſcribed them; and theſe Worlds peopled with Myriads of intelligent Beings, all Candidates for Heaven, and capable of endleſs Progreſſion in Perfection and Felicity!

If ſo much Power, Wiſdom, Goodneſs, and Magnificence is diſplayed in the material Part of the Creation, which may be but a ſmall Part of the Univerſe, how great, how wiſe, how good, muſt HE be who made and guides the Whole!

FINIS.

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